

## CLAIMS

I claim:

- 1 1). A method, comprising:
  - 2 performing parameterization on three-dimensional graphics model geometric
  - 3 data;
  - 4 performing scalar quantization on the three-dimensional graphics model
  - 5 geometric data;
  - 6 encoding the three-dimensional graphics model geometric data differentially;
  - 7 and
  - 8 generating coded and compressed three-dimensional graphics model
  - 9 geometric data.
- 1 2). The method of claim 1, wherein the three-dimensional graphics model
- 2 geometric data includes normalized normal vectors.
- 1 3). The method of claim 2, wherein performing parameterization further
- 2 comprises mapping the normalized normal vectors into actual spherical
- 3 coordinate values.
- 1 4). The method of claim 3, wherein performing scalar quantization further
- 2 comprises generating actual quantized spherical coordinate values.
- 1 5). The method of claim 4, wherein encoding the three-dimensional graphics
- 2 model geometric data differentially further comprises:
  - 3 generating predicted quantized spherical coordinate values from at least one
  - 4 actual previously quantized spherical coordinate value; and
  - 5 generating error values by subtracting the predicted quantized spherical
  - 6 coordinate values from the actual quantized spherical coordinate values.

1 6). The method of claim 5, further comprising encoding the error values using  
2 entropy encoding.

1 7). The method of claim 6, wherein the coded and compressed data is Motion  
2 Pictures Experts Group 4, 3 Dimension Model Coded (MPEG4 3DMC).

1 8). A system, comprising:  
2 means for performing parameterization on three-dimensional graphics model  
3 geometric data;  
4 means for performing scalar quantization on the three-dimensional graphics  
5 model geometric data;  
6 means for encoding the three-dimensional graphics model geometric data  
7 differentially; and  
8 means for generating coded and compressed three-dimensional graphics  
9 model geometric data.

1 9). The system of claim 8, wherein the three-dimensional graphics model  
2 geometric data includes normalized normal vectors.

1 10). The system of claim 9, wherein the means for performing  
2 parameterization further comprises means for mapping the normalized  
3 normal vectors into actual spherical coordinate values.

1 11). The system of claim 9, wherein performing scalar quantization further  
2 comprises generating actual quantized spherical coordinate values.

1 12). The system of claim 11, wherein the means for encoding the three-  
2 dimensional graphics model geometric data differentially further comprises:

3 means for generating predicted quantized spherical coordinate values from at  
4 least one actual previously quantized spherical coordinate value; and  
5 means for generating error values by subtracting the predicted quantized  
6 spherical coordinate values from the actual quantized spherical coordinate  
7 values.

1 13). The system of claim 12, further comprising means for encoding the error  
2 values using entropy encoding.

1 14). The system of claim 13, wherein the coded and compressed data is  
2 Motion Pictures Experts Group 4, 3 Dimension Model Coded (MPEG4  
3 3DMC).

1 15). A computer-readable medium having stored thereon a plurality of  
2 instructions, said plurality of instructions when executed by a computer,  
3 cause said computer to perform:  
4 performing parameterization on three-dimensional graphics model geometric  
5 data;  
6 performing scalar quantization on the three-dimensional graphics model  
7 geometric data;  
8 encoding the three-dimensional graphics model geometric data differentially;  
9 and  
10 generating coded and compressed three-dimensional graphics model  
11 geometric data.

1 16). The computer-readable medium of claim 15 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer, cause said computer to further perform normalizing normal vectors  
4 from the three-dimensional graphics model geometric data.

1 17). The computer-readable medium of claim 16 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer for performing parameterization, cause said computer to further  
4 perform mapping the normalized normal vectors into actual spherical  
5 coordinate values.

1 18). The computer-readable medium of claim 16 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer for performing quantization, cause said computer to further perform  
4 generating actual quantized spherical coordinate values

1 19). The computer-readable medium of claim 18 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer for encoding the three-dimensional graphics model geometric data  
4 differentially, cause said computer to further perform:  
5 generating predicted quantized spherical coordinate values from at least one  
6 actual previously quantized spherical coordinate value; and  
7 generating error values by subtracting the predicted quantized spherical  
8 coordinate values from the actual quantized spherical coordinate values.

1 20). The computer-readable medium of claim 19 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer, cause said computer to further perform encoding the error values  
4 using entropy encoding.

1 21). The computer-readable medium of claim 20, wherein the coded and  
2 compressed data is Motion Pictures Experts Group 4, 3 Dimension Model  
3 Coded (MPEG4 3DMC).

1 22). A system, comprising:  
2 a parameterized normal encoder comprising,  
3 a processor, wherein the processor performs scalar quantization and  
4 parameterization on three-dimensional graphics model geometric data;  
5 and  
6 a storage device connected to the processor for storing instructions  
7 executed by the processor;  
8 a predictor connected to the parameterized normal encoder; and  
9 an entropy encoder connected to the predictor; wherein the system  
10 generates coded and compressed three-dimensional graphics model  
11 geometric data.

1 23). The system of claim 22, wherein the three-dimensional graphics model  
2 geometric data includes normalized normal vectors.

1 24). The system of claim 23, wherein the processor maps the normalized  
2 normal vectors into actual spherical coordinate values and quantizes the  
3 actual spherical coordinate values into actual quantized spherical coordinate  
4 values.

1 25). The system of claim 24, wherein the predictor generates predicted  
2 quantized spherical coordinate values from at least one actual previously  
3 quantized spherical coordinate value.

1 26). The system of claim 25, wherein the processor generates error values by  
2 subtracting the predicted quantized spherical coordinate values from the  
3 actual previously quantized spherical coordinate values.

1 27). The system of claim 25, wherein the entropy encoder encodes the error  
2 values using entropy encoding.

1 28). The system of claim 27, wherein the coded and compressed data is  
2 Motion Pictures Experts Group 4, 3 Dimension Model Coded (MPEG4  
3 3DMC).

1 29). A method, comprising:  
2 generating actual quantized spherical coordinate values by adding error  
3 values to predicted quantized spherical coordinate values;  
4 performing deparameterization and scalar dequantization on the actual  
5 quantized spherical coordinate values; and  
6 generating decompressed three-dimensional graphics model geometric data  
7 from the dequantized spherical coordinate values.

1 30). The method of claim 29, wherein performing deparameterization and  
2 scalar dequantization further comprises mapping spherical coordinate values  
3 into decoded, dequantized, unnormalized normal vectors.

1 31). The method of claim 30, further comprising decoding compressed three-  
2 dimensional graphics model geometric data using entropy decoding, wherein  
3 the compressed three-dimensional graphics model geometric data contains  
4 error values.

1 32). The method of claim 31, wherein generating actual quantized spherical  
2 coordinate values further comprises:  
3 adding error values to the predicted quantized spherical coordinate values to  
4 generate the actual quantized spherical coordinate values.

1 33). The method of claim 32, wherein the compressed three-dimensional  
2 graphics model geometric data is MPEG4 3DMC.

1 34). A system, comprising:  
2 means for generating actual quantized spherical coordinate values by adding  
3 error values to predicted quantized spherical coordinate values;  
4 means for performing deparameterization and scalar dequantization on the  
5 actual quantized spherical coordinate values; and  
6 means for generating decompressed three-dimensional graphics model  
7 geometric data from the dequantized spherical coordinate values.

1 35). The system of claim 34, wherein the means for performing  
2 deparameterization and scalar dequantization further comprises means for  
3 mapping spherical coordinate values into decoded, dequantized,  
4 unnormalized normal vectors.

1 36). The system of claim 35, further comprising means for decoding  
2 compressed three-dimensional graphics model geometric data using entropy  
3 decoding, wherein the compressed three-dimensional graphics model  
4 geometric data contains error values.

1 37). The system of claim 36, wherein the means for generating actual  
2 quantized spherical coordinate values further comprises:  
3 means for adding error values to predicted quantized spherical coordinate  
4 values to generate the actual quantized spherical coordinate values.

1 38). The system of claim 37, wherein the compressed three-dimensional  
2 graphics model geometric data is MPEG4 3DMC.

1 39). A computer-readable medium having stored thereon a plurality of  
2 instructions, said plurality of instructions when executed by a computer,  
3 cause said computer to perform:  
4 generating actual quantized spherical coordinate values by adding error  
5 values to predicted quantized spherical coordinate values;  
6 performing deparameterization and scalar dequantization on the actual  
7 quantized spherical coordinate values; and  
8 generating three-dimensional graphics model geometric data from the  
9 dequantized spherical coordinate values.

1 40). The computer-readable medium of claim 39 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer for performing deparameterization and scalar dequantization,  
4 cause said computer to further perform mapping spherical coordinate values  
5 into decoded, dequantized, unnormalized normal vectors.

1 41). The computer-readable medium of claim 40 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer, cause said computer to further perform decoding compressed  
4 three-dimensional graphics model geometric data using entropy decoding,  
5 wherein the compressed three-dimensional graphics model geometric data  
6 contains error values.

1 42). The computer-readable medium of claim 41 having stored thereon  
2 additional instructions, said additional instructions when executed by a  
3 computer for generating actual spherical coordinate values, cause said  
4 computer to further add error values to predicted quantized spherical  
5 coordinate values to generate the actual quantized spherical coordinate  
6 values.

1 43). The computer-readable medium of claim 42, wherein the compressed  
2 three-dimensional graphics model geometric data is MPEG4 3DMC.

1 44). A system, comprising:  
2 a parameterized normal decoder comprising,  
3 a processor, wherein the processor performs deparameterization and  
4 scalar dequantization on compressed three-dimensional graphics model  
5 geometric data; and  
6 a storage device connected to the processor for storing instructions  
7 executed by the processor;  
8 a predictor connected to the parameterized normal decoder; and  
9 an entropy decoder connected to the predictor.

1 45). The system of claim 44, wherein the compressed three-dimensional  
2 graphics model geometric data includes error values.

1 46). The system of claim 45, wherein the processor maps actual spherical  
2 coordinate values into reconstructed unnormalized, dequantized normal  
3 vectors.

1 47). The system of claim 46, wherein the predictor generates predicted  
2 quantized spherical coordinate values from at least one actual previously  
3 quantized spherical coordinate value.

4  
1 48). The system of claim 47, wherein the processor generates actual  
2 quantized spherical coordinate values by adding error values to the predicted  
3 quantized spherical coordinate values.

1 49). The system of claim 48, wherein the entropy decoder decodes the error  
2 values using entropy decoding.

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